

crashed away on his back tracks like a scalded cat. And that was the last of him.

He must have had some previous sharp experience, and perhaps been fired at and, maybe, slightly wounded.

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4. NOTE ON A REPUTED SKULL OF *NEMORHAEDUS* *CRANBROOKI*

(With two text-figures)

It is only recently (Hayman, 1961) that the existence of a bright red goral from the north-east frontier region of Assam and from extreme north Burma has been recognised and the name *Nemorhaedus cranbrookii* proposed for it. The material described consisted of a complete skin (the type) from the Adung Valley of Upper Burma, collected in 1931 by Lord Cranbrook, and a rug made of pieces of skin from animals collected in the Mishmi Hills of Assam in 1922 by Mr. H. L. Cooper. This material is in the collection of the British Museum (Natural History). Reports were also quoted from the literature as far back as 1912 indicating that the goral of this region was very distinct in colour. A still earlier reference (Blyth, 1863) indicates that a red goral from Assam was known nearly a hundred years ago.

Unfortunately, at the time of description of *Nemorhaedus cranbrookii* (1961, *Proc. zool. Soc. Lond.* **136** : 319) no skull was available for description. The type was originally complete with skull, but only the mandible could be traced. Although this gave a valuable indication of the age of the animal and the probable proportions of the missing skull to which it belonged, an obvious gap in the description remained to be filled.

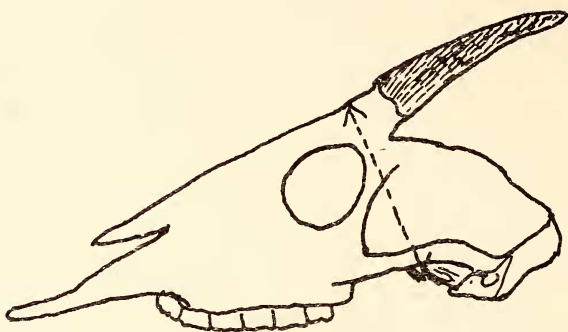
The skins forming the rug presented to the British Museum (Natural History) by Mr. H. L. Cooper in 1960 were without skulls, but I was informed by Mr. Cooper that at the time of collection a more or less complete skin and skull of this animal was sent to the Bombay Natural History Society. As a result of enquiries I have

made recently, it appears that this skin can no longer be traced, but that the Society has in its collection the skull of a goral from the Mishmi Hills entered in its records as having been received in 1925 from Mr. Cooper. I am greatly indebted to the Honorary Secretary, Mr. Humayun Abdulali, for making this skull immediately available to me in London for examination. Detailed comparison of this skull, B.N.H.S. No. 5091, with all other goral skulls available has disclosed that in certain details of structure it can be separated at once from all other known forms. The skull is unfortunately incomplete: the nasal and premaxillary bones are missing, the horns are missing, the back of the cranium has been cut away, and the first two premolars on each side have been lost. The remaining teeth show that the animal was adult but not aged. Its general condition and colour suggest that it may have been acquired originally from a Mishmi hunter or picked up in a Mishmi village, since it appears to have been smoke-dried, and the cutting away of the back of the cranium may well have been done to extract the brain for food.

In its general features the skull is undoubtedly that of a moderate-sized goral. It is in the conformation of the anterior part of the brain case that it differs from all other goral skulls seen. The plane of the horn cores is only very slightly elevated above the plane of the frontal bones forming the forehead; in most other goral skulls there is a distinct angle. The brain case shows a comparative shallowness best demonstrated by the following measurement. The total depth of the post-orbital part of the cranium measured from the surface of the frontal bone at the upper base of the horn core to the surface of the glenoid fossa is 54.5 mm. In a *Nemorhaedus goral hodgsoni* skull, B.M. No. 21.5.1.45, of the same approximate age, of almost identical overall dimensions, and with an identical maxillary tooth row length, the corresponding figure is 60. The reduction in depth of the cranium in the Mishmi skull is quite obvious, and in all larger or older goral skulls examined the difference in this part of the skull is still more obvious, as is also the generally greater elevation of the plane of the horns. (Text-fig. 1)

The distinctions outlined above leave me in little doubt that the skull from the Mishmi Hills represents *Nemorhaedus cranbrookii*. Its posterior reduction in overall depth is paralleled by the comparatively shallow depth of the mandible of the type. The following skull measurements of skull No. 5091 may be recorded here with, in parentheses, the corresponding figures for the *N. g. hodgsoni* skull, B.M. No. 21.5.1.45. Maxillary tooth row at alveoli 67 (67); palatal

breadth outside m^1-m^1 55 (56.5); zygomatic breadth 83.8 (83.5); anterior edge of orbit to anterior point of maxilla 92 (92); length of horn core from lower base 62 (50).

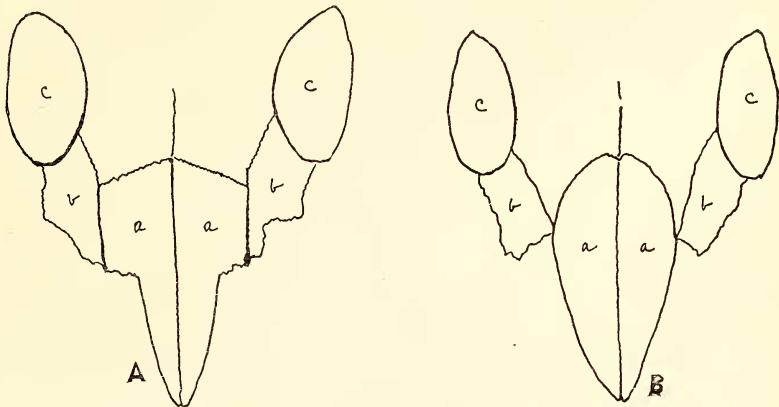


Text-fig. 1. Lateral view of goral skull to show measurement (dotted line) used in comparison. $\times \frac{3}{2}$.

While making these comparisons, a hitherto undescribed feature of the skull of the type and only known specimen of *Nemorhaedus baileyi* Pocock from south-east Tibet was noted. Pocock gave no details of the skull, and based his description of the animal as a distinct species entirely on external characters. These do not indicate any close relationship to *N. cranbrooki* although the latter is geographically not distant. The distinctive feature of the skull of *N. baileyi*, separating it clearly from all other goral skulls seen, is the form of the nasal bones and their relationship to the adjoining lachrymal bones. In all skulls of other gorals examined the posterior part of the outer margin of the nasal bone curves sharply forward to make contact laterally with the upper edge of the lachrymal bone only at or about the anterior upper angle of that bone, close to its junction with the upper edge of the maxilla. From that point the outer edge of the nasal bone tapers forward evenly to its apex. Even though the nasal bones are missing from the Mishmi Hills skull here believed to represent *N. cranbrooki*, it is obvious from the position of the sutures in relation to the lachrymals that the same pattern occurs. (Text-fig. 2, B).

On the other hand, in the skull of *N. baileyi* the posterior part of the outer edge of each nasal, instead of curving forward to make limited contact only with the anterior edge of the lachrymal, extends laterally to meet the upper edge of the lachrymal about half way along its length, i.e. about half way between the anterior margin of the orbit and the anterior upper angle of the lachrymal. Thus the outer edge

of the posterior part of the nasal bone has a long contact, about 20 mm., with the upper edge of the lachrymal and the adjoining upper edge of the maxilla. The outer edge of the nasal, instead of then tapering forward evenly to the apex as in all other gorals, forms a sharp inward angle before narrowing abruptly and then tapering forward evenly to the apex (Text-fig. 2, A). In addition the



Text-fig. 2. Nasals and lachrymals of (A) *Nemorhaedus baileyi*, Type $\times \frac{1}{2}$ and (B) *N. goral* and *N. cranbrooki*, $\times \frac{1}{2}$. (a) Nasals; (b) Lachrymals; (c) Orbits.

greatest breadth of the combined nasals, 38 mm. measured across their lateral junction with the lachrymals, is greater than in any other skull seen and very much greater than in most.

This modification of the form of the nasals, taken together with the distinctive external characters of the animal, leads to the suggestion that *N. baileyi* may eventually have to be recognised as a distinct species, and not regarded as a local subspecies of *N. goral* as in current classification.

I may here put on record that although the skull of the type of *N. cranbrooki* has remained untraced, one of the horns, fully labelled, has come to light recently. It is similar in form to those of other small gorals, is rather slender, and measures $4\frac{3}{8}$ inches on the front curve, 4 inches in a straight line.

Finally, I would appeal through the pages of this journal for sportsmen, officials, or travellers who may have the opportunity of obtaining further specimens of the red goral from the Mishmi Hills or north Burma, or from any adjoining hill territories to send complete specimens, skins with skulls, with exact data of locality, to the